

REMARKS

In view of the above amendments and following remarks, reconsideration of the rejection contained in the Office Action of June 21, 2005 is respectfully requested.

It is initially noted that a number of minor editorial changes have been made to the specification and abstract so as to generally improve the form of the application.

Further, original claims 1-6 have been canceled and replaced with new claims 7-9, 11-12 and 10, respectively. The claims have been redrafted for the sake of form, but not so as to narrow the substantive limitations thereof. Claim 13 is a new dependent claim. Claims 14-20 correspond to claims 7-13, respectively, but slightly vary the limitations thereof. Claim 14 recites coupling "central portions" of the radiator core support upper member and lower member, whereas claim 7 recites "almost center portions." Claim 14 recites "a closed multi-wall shape in cross section", whereas claim 7 recites "a box shape in cross section." However, both independent claims 7 and 14 distinguish over the prior art cited by the Examiner for similar reasons.

The present invention has recognized a problem in the prior art in that the stiffness of a hood lock stay around a coupled part with a radiator core support upper member is a problem. For example, at the time of inspection, if an inspector puts his or her hand on the radiator, with their weight thereon, the prior art arrangement was a problem.

In the present invention, the radiator core support upper member 2 has a cross sectional shape that comprises a wall portion and that is opened on at least one part thereof so as to form an opening. A hood lock stay 4 extends in a vertical direction of the motor vehicle and couples central portions of the radiator core support upper member and radiator core support lower member 3. A hood lock 6 is secured to an upper portion of the hood lock stay 4.

The upper portion of the hood lock stay 4 is provided so as to cover the opening of the open cross sectional shape of the radiator core support upper member 2 so that the radiator core support upper member and the hood lock stay are coupled with each other to form a box shape in cross section. Note in particular Fig. 3, in which the box shape 11 is illustrated as formed by vertical wall 2e on a reverse surface 2c of radiator core support upper member 2 and a recessed portion 4b of an

upper portion 10 of hood lock stay 4. This results in ensuring high stiffness around the part of the radiator core support upper member 2 that is coupled with the hood lock stay 4.

The present invention is reflected in both independent claim 7, which corresponds to original independent claim 1, and independent claim 14. Claim 7, like original claim 1, recites the upper portion of the hood lock stay being disposed to cover an opening of the open cross sectional shape of the radiator core support upper member so that the radiator core support upper member and the hood lock stay are coupled with each other to form a box shape in cross section. In claim 14, this is referred to as a multi-wall shape having an at least partly enclosed interior space in cross section. Such aspect of the present invention is neither disclosed nor suggested by the cited patent to Joutaki et al.

The Examiner cited Joutaki as having a radiator core support upper member 13 extending in a transverse direction of a motor vehicle, a radiator core support lower member 14 and a hood lock stay 15 coupled in a vertical direction of the motor vehicle. The Examiner further stated that the radiator core support upper member is formed to have at least an open cross-sectional shape provided with the wall portion, and that the radiator core support upper member and the hood lock stay are coupled with each other in a state so as to form a box shape by the upper portion of the hood lock stay covering an opening of the cross-section of the radiator core support upper member as seen in Figure 1. However, it is respectfully submitted that Joutaki does not disclose such a feature.

Upon reviewing Joutaki, it is clear that it does not disclose or teach the radiator core support upper member and the hood lock stay being coupled with each other to form a box shape with the upper portion of the hood lock stay covering an opening of the cross-section of the radiator core support upper member. In Joutaki, the hood lock stay 15 extends vertically between intermediate portions of radiator core upper and lower elongate members 13 and 14. Hood lock stay portion 15 has its upper portion connected to member 13 through a hood lock mounting member 16 which is welded to an intermediate portion of member 13. Note lines 47-54 of column 3 of the specification, as well as Figs. 1-3 and 6.

Elongate member 13 has a rearwardly opening cross-sectional shape, which can for example be seen from Fig. 5. On a front side intermediate flat portion of the member 13, the vertical top

portion of the hood lock mounting member 16, shown in Fig. 4, for example, is welded, as shown in Figs. 3 and 6, and as described in column 3, lines 55-58. Note the two ribs that are formed on the vertical top portion and a horizontal portion of the hood lock mounting member 16, as shown in Fig. 4. The intermediate flat portion of the radiator core support upper elongate member 13 is formed with no rib. As can be seen from Figs. 1-3, the ribs of the hood lock mounting member 16 are positioned at the front side of the radiator core support upper elongate member 13 when they are welded to each other. This positioning demonstrates that the hood lock mounting member 16 and the radiator core support upper elongate member 13 are connected with each other on their flat surfaces, and do not form a box shape between them. In other words, the hood lock mounting member 16 does not cover an opening of an open cross-sectional shape of the radiator core support upper member as required by claims 7 and 14. The upper portion of the hood lock stay does not cover an opening, and they do not form the box shape (or the multi-wall shape having an at least partly enclosed interior space in cross section as required by claim 14). For this reason, both independent claims 7 and 14 clearly distinguish over Joutaki. Indication of such is respectfully requested.

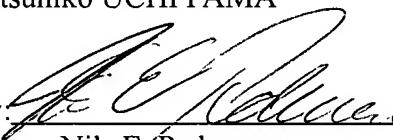
The Examiner indication of allowable subject matter in the remaining claims is gratefully acknowledged. However, it is believed that all of the claims distinguish over Joutaki, and allowance of all of the claims is thus requested.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicant's undersigned representative.

Respectfully submitted,

Tatsuhiko UCHIYAMA

By:



Nils E. Pedersen
Registration No. 33,145
Attorney for Applicant

NEP/krg
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
September 21, 2005



COUPLING STRUCTURE OF HOOD LOCK STAY

BACKGROUND OF THE INVENTION

5 1. FIELD OF THE INVENTION

The present invention relates to a coupling structure of a hood lock stay which couples ~~is coupled each other with almost~~ center portions of a radiator core support upper member and a radiator core support lower member of a radiator core support of a motor vehicle such as an automobile, the hood lock stay securing a hood lock to the upper portion thereof.

2. DESCRIPTION OF THE RELATED ART

A conventional radiator core support for an automobile is disclosed for example in Japanese Patent Laid-Open No. Tokkai 2002-120760. This 15 radiator core support is mainly composed of a radiator core support upper member extending in a transverse direction of the automobile and a radiator core support lower member running parallel thereto under the same, ~~a.~~ A radiator core support side member couples ~~coupling~~ the right and left ends of the radiator core support upper member and those of the radiator core support lower member with each other, ~~and a.~~ A hood lock stay couples ~~coupling~~ each center portion of the radiator core support upper member and the radiator core support lower member with each other.

However, in the radiator core support in the prior art, the upper portion of 25 the hood lock stay and the radiator core support upper member are secured to each other with their surfaces being appressed to each other. Therefore, stiffness shows a tendency to lower around the coupled part of the radiator core support upper member with the hood lock stay. As a result, at the time, for example, of a safety inspection of a motor vehicle, when an inspector put 30 his/her hand on the radiator core support upper member with his/her weight thereon, ~~the lack of there occurs a problem of lacking the stiffness is a problem.~~

5 Further, with the hood lock stay of ~~the~~ lower stiffness, it is impossible to secure the hood lock in a stable manner, so that there is a probability of causing a flip-flop of an engine hood and of lowering sound vibration performance while driving.

SUMMARY OF THE INVENTION

10 The present invention is made by focusing on the previously-mentioned problems. An object of the present invention is to provide a coupling structure of a hood lock stay capable of improving stiffness around a coupled part of a radiator core support upper member with a hood lock stay, and capable of realizing stable securing of the hood lock.

15 The coupling structure of the hood lock stay of the present invention is composed of a ~~the~~ radiator core support upper member extending in a transverse ~~traverse~~-direction of a motor vehicle, a radiator core support lower member extending under the radiator core support upper member in the transverse ~~traverse~~-direction of the vehicle, and a ~~the~~ hood lock stay which is coupled in a vertical direction of the vehicle ~~each other~~ with almost center portions of the radiator core support upper member and the radiator core support lower member, ~~the~~. The hood lock stay secures ~~securing~~ a hood lock to an upper portion thereof, ~~in which the~~. The radiator core support upper member is formed to have at least an open ~~opened~~ cross-sectional shape provided with a wall portion, and the radiator core support upper member and the hood lock stay are coupled with each other in a state ~~in which they form~~ forming a box shape by disposing an ~~the~~ upper portion of the hood lock stay so as to cover an opening of the opened cross-section of the radiator core support upper member.

20 25 30 In the above-described coupling structure of the hood lock stay, the radiator core support upper member and the hood lock stay are coupled with each

other in the state forming the box shape by themselves.

Consequently, this box shape improves ~~enables to improve~~ the stiffness around the coupled part of the radiator core support upper member with the hood lock stay, allowing, as a result, ~~these~~ improvements in the stiffness to a ~~the~~ level ensuring sufficient ~~enough~~ stiffness to ~~resistant to~~ an inspector's weight at the time, for example, of a ~~the~~ safety inspection of the radiator core support upper member of the motor vehicle, in engine hood fastening performance, and in sound vibration performance.

10

Preferably, the hood lock stay is formed in the upper portion thereof with a recessed portion which is recessed in a front-to-rear direction of the motor vehicle, ~~and with~~. With a wall portion of the recessed portion, the opening of the radiator core support upper member is covered to ~~thereby~~ form the box shape.

In order to form the box shape, what are used are the recessed portion formed by recessing the upper portion of the hood lock stay in the front-to-rear direction and the reverse surface of the radiator core support upper member so that the stiffness of the upper portion of the hood lock stay can be improved and that no additional parts for forming the box shape are ~~is~~ required.

Preferably, the recessed portion is formed essentially all-over all of the vertical length of the hood lock stay.

Since the recessed portion is formed essentially all-over all of the vertical length of the hood lock stay, the entire stiffness of the hood lock stay can be improved to thereby further serve to improve the entire stiffness of the radiator core support.

Preferably, the wall portion of the radiator core support upper member is

composed at least of an upper wall portion having an almost horizontal surface and a vertical wall portion adjoining the upper wall portion and extending in the transverse and vertical direction of the vehicle.

5 Consequently, the upper portion of the hood lock stay is in the state supporting the upper wall portion of the radiator core support upper member, so that the stiffness of the radiator core support upper member, particularly that in the vertical direction of the vehicle, can be enhanced.

10

BRIEF DESCRIPTION OF THE DRAWINGS

The objects, features, and advantages of the present invention will become apparent as the description proceeds when taken in conjunction with the accompanying drawings, in which:

15

FIG. 1 is a perspective front view showing a hood lock stay of an embodiment according to the present invention;

20

FIG. 2 is a perspective rear view showing the hood lock stay of FIG. 1 according to the embodiment; and

FIG. 3 is a cross-sectional side view, taken along a-S3—S3-line S3-S3 in FIG. 1, of a an top end portion of the hood lock stay .

25

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereinafter, an embodiment of the present invention will be described based on the drawings.

30

~~FIG. 1 is a perspective front view showing a coupling structure of a hood lock stay according to the embodiment of the present invention;~~

~~FIG. 2 is a perspective rear view showing the coupling structure of the hood lock stay according to the embodiment of the present invention; and~~

~~FIG. 3 is a cross-sectional view taken along an S3—S3 line in FIG. 1.~~

5

As shown in FIG. 1 and FIG. 2, in the coupling structure of the hood lock stay according to the embodiment of the present invention, a radiator core support 1 is composed of a radiator core support upper member 2 and a radiator core support lower member 3 extending in the transverse traverse direction of a motor vehicle at in the upper and the lower positions, respectively, and a hood lock stay 4 extending in the vertical direction while being coupled each other with the center portions of the radiator core support upper member 2 and the radiator core support lower member 3. These three components, the radiator core support 1, the radiator core support upper member 2, and the radiator core support lower member 3 are all made of metal.

Further, the radiator core support upper member 2 is formed to have a U-shaped cross-section opening opened rearward. A center portion 2a located at the center of the radiator core support upper member 2 is formed to fit in the shape of a hood lock 6. It and is provided by extending from the bottom end of the front surface side of the radiator core support upper member 2 toward to the lower side.

Furthermore, in the adjacent left and right positions adjacent to the center portion 2a, there are formed bolt through holes 2b, 2b as described below.

The radiator core support lower member 3 is formed to have the U-shaped cross-section opening opened rearward and is welded and secured by spot welding to the two places X1, X1 at the right and left of the lower portion of the hood lock stay 4.

At the right and left ends of the hood lock stay 4, there are provided flange portions 4a, 4a bent toward the ~~to~~ rearward side. Also, at the center of the hood lock stay 4, a recessed portion 4b, ~~being recessed~~ toward the rearward side, is formed essentially all over all of the vertical length of the hood lock stay 4.

As shown in FIG. 3, further, the recessed portion 4b has a hood lock plate 5 welded and secured by spot welding at two places X2, X2 on ~~of~~ the lower right and left portions of the same, ~~the~~. The hood lock plate 5 has ~~having~~ a bolt through hole 5a.

As shown in FIG. 1 and FIG. 2, the hood lock stay 4 is formed to have an upper portion 10 that is ~~being~~ curved and expands ~~expanding~~ gradually in the horizontal direction upward from almost a vertical midpoint thereof.

15 The upper portion 10 of the hood lock stay 4 is welded and secured by spot welding at two places X3, X3, as shown in FIG. 2, to a ~~the~~ reverse surface 2c of the center portion 2a of the radiator core support upper member 2.

20 Also, in the upper portion 10 of the hood lock stay 4, there are formed relief holes 4c, 4c for a fixed bolt, not shown, for bolting a ~~the~~ hood lock 6.

As shown in FIG. 3, the edge of the upper portion 10 of the hood lock stay 4 is bent rearward to form in an L-shape so as to have a flat portion 4d. This which is welded and secured by two-spot welding at two places X4, X4 to the right and left on ~~of~~ the upper wall portion 2d, which continues ~~continuing~~ from a vertical wall portion 2e on the reverse surface 2c of the radiator core support upper member 2.

30 Accordingly, as shown in FIG. 3, the upper wall portion 2d of the radiator core support upper member 2 is secured to the flat portion 4d of the hood lock stay 4 in a ~~the~~ state supported by the flat portion 4d; so that the stiffness

in the vertical direction of the radiator core support upper member 2 is enhanced.

5 Additionally, as shown in FIG. 3, a box shape 11 is formed ~~surrounded~~ by the vertical wall 2e on the reverse surface 2c of the radiator core support upper member 2, including the center portion 2a, and the recessed portion 4b of the upper portion 10 of the hood lock stay 4. As a result, it is designed so that high stiffness is ensured around the ~~coupled~~ part of the radiator core support upper member 2 coupled with the hood lock stay 4.

10

Note that it is not required to form a complete closed space inside the box shape 11, and ~~such~~ a space such as a partly opened space may be formed therein to the extent that ~~the~~ high stiffness is ensured.

15

Also, as shown in FIG. 1 to FIG. 3, the hood lock 6 is secured by being coupled at concluded with three places in total, namely to the bolt through hole 5a of the hood lock plate 5 and to the two bolt through holes 2b, 2b of the radiator core support upper member 2, by inserting bolts therethrough from the front side ~~respectively~~.

20

25

Consequently, in the coupling structure of the hood lock stay of the present embodiment, the reverse surface 2c of the radiator core support upper member 2, including the center portion 2a, and the upper portion 10 of the hood lock stay 4 form the box shape 11 to thereby ~~allow to~~ improve the stiffness around the coupled part of the radiator core support upper member 2 with the upper portion 10 of the hood lock stay 4, ~~so that, as~~ As a result, improvement in stiffness can be made sufficient to ensure to the level ~~ensuring~~ enough stiffness even when an inspector puts ~~put~~ his/her hand on the radiator core support upper member 2 with his/her weight thereon at the time, for example, of a safety inspection of the radiator core support upper member of the motor vehicle.

30

Further, since the hood lock 6 is secured to the three places in total, namely to the radiator core support upper member 2 and the hood lock plate 5, the hood lock 6 can be stably secured, thereby whereby bringing about effects of enabling improvement in engine hood fastening performance and sound vibration performance.

While a preferred embodiment of the present invention has been described hereinbefore, it is to be understood that the particular features of the present invention are not intended to be limited to the present embodiment, and any 10 change in design and the like may be made therein without departing from the spirit of the invention. Such changes are also included in the scope of the present invention.

For example, the materials and the securing manners manner of securing the 15 radiator core support upper member 2, the radiator core support lower member 3, and the hood lock stay 4 of the present embodiment may be set appropriately.

Moreover, the welding place and the number of the spot welding at the 20 places X1 to X4 may be set appropriately.

Additionally, as a fastener other than the spot welding at the places X1 to X4, a the bolt or a nut may be used.

ABSTRACT

5 A The coupling structure of a hood lock stay couples, which is coupled in
the vertical direction of a vehicle, each other with almost center portions of a
radiator core support upper member and a radiator core support lower
member, respectively extending in the transverse direction of the motor
vehicle, the. The hood lock stay secures securing a hood lock to the upper
portion thereof, in which the. The radiator core support upper member is
formed to have an open opened cross-sectional shape provided with at least
10 a wall portion. The upper portion of the hood lock stay is disposed so as to
cover the opening of the opened cross-section of the radiator core support
upper member, so that a box shape is formed. In this state of forming the
box shape, these two are coupled.